GEOMETRY.

510. Proposed by JOSEPH E. ROWE, State College, Pa.

Show how to find the equation of a line parallel to a side of the triangle of reference and passing through a given point, in any system of homogeneous coördinates, using the condition that two lines are parallel in this system but not the condition that two lines are perpendicular. Illustrate the method by using it to find the trilinear coördinates of the points of contact of one escribed circle of the triangle.

511. Proposed by FRANK V. MORLEY, Student, Haverford College, Pa.

Let a_i ($i = 1, 2, 3, 4$) be four points on a circle and let the in-center of the triangle formed by omitting a_i be c_i; prove that the four points c_i form a rectangle.

CALCULUS.

425. Proposed by O. S. ADAMS, U. S. Coast and Geodetic Survey, Washington, D. C.

Show that the infinite product

$$(1 - z)(1 + \tfrac{1}{2}z)(1 - \tfrac{1}{3}z)(1 + \tfrac{1}{4}z)\cdots = \frac{\sqrt{\pi}}{\Gamma(1 + \frac{1}{2}z)(\frac{1}{2} - \frac{1}{2}z)}.$$

426. Proposed by C. N. SCHMALL, New York City.

If A be the area of a plane triangle constructed with the sides a, b, c, such that

$$a^3 + b^3 + c^3 = 3k^3,$$

show that the maximum value of A is $\frac{1}{4}k^2$.

MECHANICS.

342. Proposed by WILLIAM HOOVER, Columbus, Ohio.

A uniform rod of length $2a$ is freely hinged at one end, at the other end a string of length b is attached which is fastened at its further end to a point on the surface of a homogeneous sphere of radius c. If the masses of the rod and sphere are equal, find the motion of the system when slightly disturbed from the vertical, and the cubic equation giving the corresponding small oscillations.

343. Proposed by J. ROSENBAUM, New Haven, Conn.

Two bodies of equal masses and coefficients of friction μ_1 and μ_2 are connected by a light spring of stiffness k and placed on an inclined plane. Discuss the motion of each body when the angle between the non-stretched spring and the plane is θ.

NUMBER THEORY.

261. Proposed by NORMAN ANNING, Chilliwack, B. C.

Show that for any positive integer n (excluding powers of 2) positive integers a_1, a_2, a_3, $\cdots a_k$, which are less than $n/2$ can be chosen in such a way that

$$2^k \cos(a_1\pi/n) \cos(a_2\pi/n) \cos(a_3\pi/n) \cdots \cos(a_k\pi/n) = 1.$$

262. Proposed by C. N. SCHMALL, New York City.

If x, y, z are three integers, consecutive among the integers prime to 3, show that

$$x(x - 2y) - z(z - 2y) = \pm 3.$$

SOLUTIONS OF PROBLEMS.

ALGEBRA.

J. A. BULLARD and J. W. BALDWIN solved 464. These solutions were received after selections for publication were made.